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# New Data on the Distribution of Primates in the Region of the Confluence of the Jiparaná and Madeira Rivers in Amazonas and Rondônia, Brazil

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ABSTRACT — Data on the distribution of primates in the region of the confluence of the Jiparaná and Madeira Rivers in western Brazilian Amazonia are presented. New localities are recorded for a number of species, in addition to range extensions for both *Callicebus moloch* and *Saguinus fuscicollis weddelli*. These findings, along with information given by local residents on the distribution of other species indicate that the Jiparaná River plays a significant role in the zoogeography of the primates of the region.

KEY WORDS — primates, distribution, *Callicebus moloch*, *Saguinus fuscicollis weddelli*, Madeira River, Jiparaná River.

RESUMO — Dados sobre a distribuição de primatas na região da confluência dos rios Jiparaná e Madeira na Amazônia ocidental brasileira são apresentados. Localidades novas são registradas para várias espécies, e ampliações significativas das distribuições de *Callicebus moloch* e *Saguinus fuscicollis weddelli* são indicadas. Esses resultados, junto às informações cedidas por moradores sobre a distribuição de outras espécies, indicam que o Rio Jiparaná exerce um papel importante na zoogeografia dos primatas da região.

PALAVRAS-CHAVE — primatas, distribuição, *Callicebus moloch*, *Saguinus fuscicollis weddelli*, Rio Madeira, Rio Jiparaná.



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## INTRODUCTION

While undoubtedly at least as well documented as other areas of the upper Amazon, the Madeira River basin is still relatively poorly known with regards to primate distributions (see de Vivo 1985). This is exemplified by the recent discovery of the saddle-back tamarin, *Saguinus fuscicollis weddelli*, on the right or east bank of the river (de Vivo 1985, Martins *et al.* 1987) when its geographical range had previously been restricted to the west bank (Hershkovitz 1977).

With this in mind, the principal aim of the present study was the collection of information on the distribution of primates, in particular *S. f. weddelli* and titi monkeys (*Callicebus* spp.), in the region of the confluence of the Jiparaná and Madeira Rivers in the Brazilian states of Amazonas and Rondônia. Range extensions for both *S. f. weddelli* and *Callicebus moloch* are reported, and the results of the study show that the Jiparaná plays an important role in the zoogeography of these and at least three other primate taxa.

## METHODS

Five sites in the Jiparaná/Madeira region (Fig. 1) were visited for periods of one to six days between 31 Aug and 22 Sep 1990. Data on the occurrence of primates at each site were compiled through a combination of specimen collection, direct observation and interviews with local residents. Interviews followed a format, developed in a previous study (Ferrari & Lopes Ferrari 1990), designed to avoid direct prompting and increase the accuracy of the information collected. Nevertheless, such information was always corroborated, as far as possible, through the collection of field data.

With the assistance of local residents, where available, existing trails in forest habitats at each site were utilized for the collection of observational records and specimens. Time in the field is given as "field days", according to the division of personnel (the survey of two different areas at the same site on the same day by two different researchers is counted as two field days). The identification of specimens was carried out through reference to available literature and comparisons with material in the zoological collection of the Goeldi Museum. The specimens collected were also deposited at the Goeldi Museum, representing the series MPEG 21990 - MPEG 22013.

**RESULTS**

Site 1. Right bank of Madeira River opposite Humaitá, Amazonas (7°31'S, 63°52'W).
Habitat: disturbed *terra firme* forest (logging).
Duration: One field day.
Observations: *Cebus apella, Nasua nasua, Sciurus spadiceus*.
Specimens collected: *Saimiri madeirae* (sensu Thorington 1985), adult male (MPEG 21993), juvenile female (MPEG 21992).

Site 2. Lago dos Reis, Amazonas, km 17 on BR-230 Humaitá-Itaituba (7°32'S, 62°52'W).
Habitat: secondary and disturbed *terra firme* forest (logging, agriculture and cattle ranching).
Duration: Six field days.
Interviews: absence of *Alouatta* and *Saguinus* reported. Presence of *Ateles, Aotus, Chiropotes* and *Lagothrix* indicated.
Observations: absence of both *Alouatta* and *Saguinus* confirmed.
Specimens collected: *Callithrix nigriceps*, three adult males (MPEG 21996, MPEG 21998, MPEG 21999); *Saimiri madeirae*, two adult males (MPEG 21990, MPEG 21991); *Callicebus moloch*, adult female (MPEG 22000); *Pithecia irrorata*, adult male (MPEG 22001).

Site 3. Training reserve of the 54th Rain Forest Infantry Battalion (54° BIS), Humaitá, Amazonas, km 20 on BR-230 Humaitá - Lábrea (7°33'S, 63°12'W).
Habitat: slightly disturbed *terra firme* forest (army training).
Duration: Two field days.
Observations: *Mustela* cf. *africana*. Mammals rare.
Specimen collected: *Saguinus labiatus labiatus*, adult female (MPEG 22002).

Site 4a. Left bank of the Jiparaná River at Calama, Rondônia (8°05'S, 62°53'W).
Habitat: undisturbed *terra firme* forest bordering agricultural land.
Duration: Two field days.
Interview: *Alouatta, Cebus albifrons, Chiropotes* and *Lagothrix* reported as being absent. *Alouatta* reported to occur on west bank of Madeira, *Chiropotes* on east bank of Jiparaná only. Presence of *Aotus* and *Callithrix* indicated. Absence of primates on islands in the Jiparaná subject to seasonal flooding.
Observations: *Ateles paniscus, Pithecia irrorata, Saimiri* observed. Absence of *Alouatta* confirmed. Primates abundant.
Specimens collected: *Cebus apella*, adult female (MPEG 22004), infant male (MPEG 22005), *Saguinus fuscicollis weddelli*, adult female (MPEG 22003); *Callicebus brunneus*, adult female (MPEG 22006).

Site 4b. Right bank of the Jiparaná River at Calama, Rondônia (8°03'S, 62°53'W).
Habitat: Secondary and disturbed *terra firme* forest (logging, agriculture and cattle ranching).
Duration: Four field days.
Interviews: *Alouatta* absent, but reported to occur on west bank of Madeira. Some reports of *Saguinus*. Presence of *Aotus, Ateles, Cebus, Chiropotes, Lagothrix* and *Pithecia* indicated.
Observations: Absence of *Alouatta* and *Saguinus* confirmed. Mammals rare.
Specimens collected: *Saimiri madeirae*, adult male (MPEG 21995), adult female (MPEG 21994); *Callicebus moloch*, adult male (MPEG 22007); *Callithrix nigriceps*, adult female (MPEG 21997); *Tamandua tetradactyla*, adult female (MPEG 22008).

Site 5. Ipixuna River, Amazonas, km 41 on BR-230 Humaitá-Lábrea (7°31'S, 63°22'W).
Habitat: secondary, disturbed and undisturbed *terra firme* forest (agriculture); igapó forest.
Duration: seven field days.
Interviews: presence of *Alouatta, Aotus, Ateles, Cebus albifrons* and *Pithecia* indicated. *Alouatta* reported to be restricted to igapó habitats and/or areas from which *Lagothrix* is absent. Occurrence of different forms of *Saimiri* in *terra firme* and igapó habitats also indicated.
Observations: *Lagothrix lagothrica, Saimiri* sp. (local pet = *S. madeirae*), *Eira barbara, Felis yagouaroundi, Felis pardalis, Mazama americana, Sciurus spadiceus, Sciurus* sp. Mixed groups of *S. f. weddelli* and *S.l. labiatus* were observed on both banks of the Ipixuna. *Alouatta* vocalizations heard, hunted *A. seniculus* seen.
Specimens collected: *Callicebus caligatus*, adult male (MPEG 22012), adult female (MPEG 22011); *Cebus apella*, adult female (MPEG 22013); *Saguinus fuscicollis weddelli*, adult male (MPEG 22010); *Saguinus labiatus labiatus*, adult female (MPEG 22009).

## DISCUSSION

### Distribution of *Callicebus*

In his 1988 and 1990 reviews, Hershkovitz identifies the region between the Aripuanã and Madeira Rivers as a lacuna in the distribution of the genus *Callicebus* (Hershkovitz 1990: Fig. 1, p.4). The evidence from the present study indicates, on the contrary, that the geographical range of *C. moloch* extends as far west as the confluence of the Jiparaná and Madeira and suggests that the Aripuanã does not play a significant role in the distribution of the species.

*C. moloch* was apparently common at sites 2 and 4b and, unless these are seen as isolated populations, it seems reasonable to assume that the species occurs throughout the area between the Aripuanã and the Madeira, wherever suitable habitat is available. The absence of records of the genus from this area remains equivocal for a number of reasons, not least because of the obvious nature of *C. moloch* duetting and the species' preference for riverbank habitats (Kinzey 1981).

The collection of *C. brunneus* from the left bank of the Jiparaná (site 4a) and *C. caligatus* from the Ipixuna River (= left bank of the Madeira) is in agreement with Hershkovitz (1988, 1990). The confluence of the Jiparaná and Madeira Rivers thus forms a division between the geographical ranges of three of the eight species of the *C. moloch* group (sensu Hershkovitz 1988, 1990).

**Distribution of *Saguinus fuscicollis weddelli***

The most widely distributed of tamarin species, *S. fuscicollis* occurs throughout much of the upper Amazon basin (Hershkovitz 1977: Fig. X.24, p. 636). The eastern limits of the species's range are poorly defined, with a lack of information from the region between the lower inter-Madeira-Purús basin (Hershkovitz 1977) and recent observations of *S. f. weddelli* east of the Madeira river in Rondônia (de Vivo 1985, Martins *et al.* 1987).

In his Figure X.24, Hershkovitz (1977) postulates that the Ipixuna River is the eastern limit of the range of *S. f. weddelli*. In addition to being the major tributary between the lower Madeira and Purús, the upper reaches of the Ipixuna make contact with a large area of cerrado and campo vegetation to the south and west of Humaitá. The combination of these features could form an effective barrier for the dispersion of small arboreal primates such as tamarins, although observations of *S. f. weddelli* on both banks of the Ipixuna River indicate that its distribution extends farther east.

*S. f. weddelli* was twice observed at close quarters on the right bank of the Ipixuna and there was little doubt as to the taxon, especially as the characteristic whitish band above the eyes clearly distinguishes this subspecies from the only other on the lower Purús, *S. f. avilapiresi*. The extent to which the range of *S. f. weddelli* extends eastward into the lower inter-Madeira-Purús remains unclear (Fig. 2), despite its proximity to Manaus.

Data collected on the Jiparaná River are more definitive. *S. f. weddelli* was collected on the west bank, where it appears to be a member of a primate community equivalent to that recorded farther west at Samuel (Fig. 1; Schneider et al. 1990). *Saguinus* does not appear to occur to the east of the Jiparaná. Unless it is both very rare and ecologically distinct from its conspecifics, the field data leave little doubt as to the absence of a *S. fuscicollis* population east of the Jiparaná. At Samuel, *S. f. weddelli* is one of the most conspicuous primates, especially at forest edges, and is commonly seen in mixed troops with

*Callithrix emiliae* (Martins *et al.* 1987, Lopes and Ferrari, in prep.). Despite numerous sightings of *C. nigriceps* in edge and disturbed forest habitats during eleven field days at sites 1, 2 and 4b, tamarins were not observed in this region.

With the data from the present study, the range of *S. f. weddelli* can be extended farther eastward on both banks of the Madeira (Fig. 3), but more information will be needed before the northern and southern limits of this range extension can be defined.

**Distribution of other primates in the region and the zoogeographical role of the Jiparaná River.**

According to the data collected, the primate community on the left bank of the Jiparaná River at Calama (site 4a) appears to be the same as that at Samuel, some 100 km to the southwest, as might be expected from the lack of any major geographical barriers between the two sites. In addition to *C. brunneus* and *S. fuscicollis*, six species were recorded at Samuel (*Aotus azarae, Ateles paniscus, Callithrix emiliae, Cebus apella, Pithecia irrorata* and *Saimiri madeirae*: Schneider *et al.* 1990).

The absence of *Chiropotes albinasus* from both sites contradicts Hershkovitz (1984a: Fig. 1, p. 2), who defines the Guaporé River as the southwestern limit of this species' range. An experienced local hunter was categorical in restricting the distribution of *C. albinasus* east of the Jiparaná, on the contrary, and there are in fact no collecting records from Rondônia west of this river (Allen 1916, de Vivo 1985, Schneider et al. 1990). Hershkovitz's interpretation appears to be based on the erroneous placement of the Jaru Biological Reserve west of the Jiparaná (1984a: locality 53a, Fig. 2, p. 3) when it is in fact located on the right or east bank. The available evidence indicates, then, that the eastern limit of the geographical distribution of *Chiropotes albinasus*, as that of *Callicebus moloch*, is defined by the Jiparaná/Madeira Rivers and not the Guaporé.

The apparent absence of *Alouatta*, the most widely-distributed of all platyrrhine genera, from all but one of the sites raises a number of questions, given that these primates are found in a wide range of habitats types and "are often the only monkeys left in areas used by humans" (Neville et al. 1988: p. 363). Hill (1962: Map 1, pp. 136-137) identifies the Jiparaná/Madeira as the western limit of the geographical range of the *Alouatta belzebul*, but lacked information on the distribution of the genus in the remainder of Rondônia. A specimen of *A. seniculus* (MPEG 19707) was collected in Rondônia at Alvorada do Oeste, 300 km south of Samuel and to the west of the Jiparaná, and this species was observed at the Ipixuna River site. Bonvicino *et al.* (1989) record *A. belzebul* from both banks of the lower Madeira. Hence, the distribution of *Alouatta* in this region and the variables determining distribution patterns undoubtedly deserve further study.

Specimens of two other primates collected during the present study lend additional emphasis to the zoogeographical role of the Jiparaná. The lower Jiparaná appears to separate the geographical ranges of *C. emiliae* and the newly-described *Callithrix nigriceps* Ferrari and Lopes 1992. According to collecting localities at Rio Castanho and Nova Brasília (de Vivo 1985), *C. emiliae* does occur east of the Jiparaná, however, and Ferrari and Lopes (1992) suggest that the eastern limit of the range of *C. nigriceps* may be Rio dos Marmelos. More information will be needed before this situation can be defined.

Humaitá is the type locality for *Saimiri madeirae* Thomas 1908, and all the specimens collected agree with descriptions of this species (Thorington 1985). Squirrel monkeys from Samuel agree with Hershkovitz's (1984b) description of *Saimiri ustus*, on the other hand. The difference is most striking in the case of the preauricular patch, which in "*Saimiri ustus* ... [is] consistently eumelanized in females ... in most males [sexual dichromatism] is heightened by dilution of the eumelanin of the agouti..." (Hershkovitz 1984b: 162). Specimens from Samuel in the Goeldi Museum collection agree with this description, while those collected on the east bank of the Jiparaná/Madeira at sites 1, 2 and 4b exhibit a creamy white preauricular patch, sharply contrasting with the agouti of the crown, in both sexes. There is also a marked difference in the coloration of the forelimbs. In specimens from Samuel, both the hand and the fore-arm are yellow, while in those collected during this present study, yellow is restricted to the hands.

Far from resolving squirrel monkey taxonomy, the two most recent reviews (Hershkovitz 1984b, Thorington 1985) have stimulated further controversy, exacerbated by both the discovery of a new form (Ayres 1985) and a growing body of evidence on taxonomic relationships between the different forms (Silva 1990, Silva Jr., in prep.). Thus, while the Jiparaná may constitute an effective barrier between two parapatric forms of squirrel monkey, it remains unclear whether these forms should be seen as species, subspecies or geographical races.

Overall, then, the results of the present study indicate that the Jiparaná River is an important geographical barrier for a number of primate genera. Additional data on other taxa may further reinforce this view. The recent discovery of *Aotus azarae* at Samuel (Schneider et al. 1990), for example, confirms that the distribution of this species extends farther northwards than it was possible to ascertain with the evidence available previously (Hershkovitz 1983). The Jiparaná is the only major river which lies between Samuel and the Roosevelt River, nearest known locality of *Aotus nigriceps* (Hershkovitz 1983). The collection of more detailed information on the distribution of these and other primates (*Alouatta, Ateles, Cebus, Pithecia* and *Lagothrix*) in this region would help to resolve a number of important questions.

**Primate conservation in the study area**

In common with much of the Amazon Basin (e.g., Fearnside 1990), the construction of highways and subsequent colonization have had deleterious effects for the flora and fauna of the study area. Selective logging and forest clearance for agricultural plots and cattle grazing have created a typical mosaic of disturbed and secondary forest habitats at three of the four sites visited along the Trans-Amazon Highway (sites 1, 2 and 5), as well as in the vicinity of the village of Calama (site 4b), which is easily accessible from Porto Velho by the Madeira River.

Site 3 is an exception, presenting a large area (approximately 10,000 ha) of relatively undisturbed forest bordering the Trans-Amazon highway. While the forest is relatively well preserved, Army training (which including hunting as a survival tactic) appears to have had a devastating effect on the vertebrate fauna. The only primates observed were a group of *S.l. labiatus*, although a group of four weasels, *Mustela cf. africana*, was also encountered.

While fish was the main source of protein for local residents at all the sites visited, hunting with shotguns is common practice. As in other regions of Brazilian Amazonia (Redford & Robinson 1987), medium or large primates such as *Alouatta, Ateles, Cebus, Chiropotes* and *Lagothrix* were generally among the preferred and/or most frequently cited game animals. This preference was reflected in the apparently low densities of these primates at most sites. In addition to being unattractive as game, habitat disturbance has favored the smaller forms such as the callitrichids, squirrel monkeys and titis, which were relatively abundant at most sites.

Despite hunting pressures, large mammals appeared to be relatively abundant at the Ipixuna River site (see results). At 2 km west of the community, for example, a group of more than twenty woolly monkeys, *L. lagothrica*, was encountered in the forest edge bordering the Trans-Amazon Highway, even though these large primates are among the most vulnerable to hunting (Peres 1990a) and may actively avoid sites of human activity such as roads at other sites (Peres 1990b).

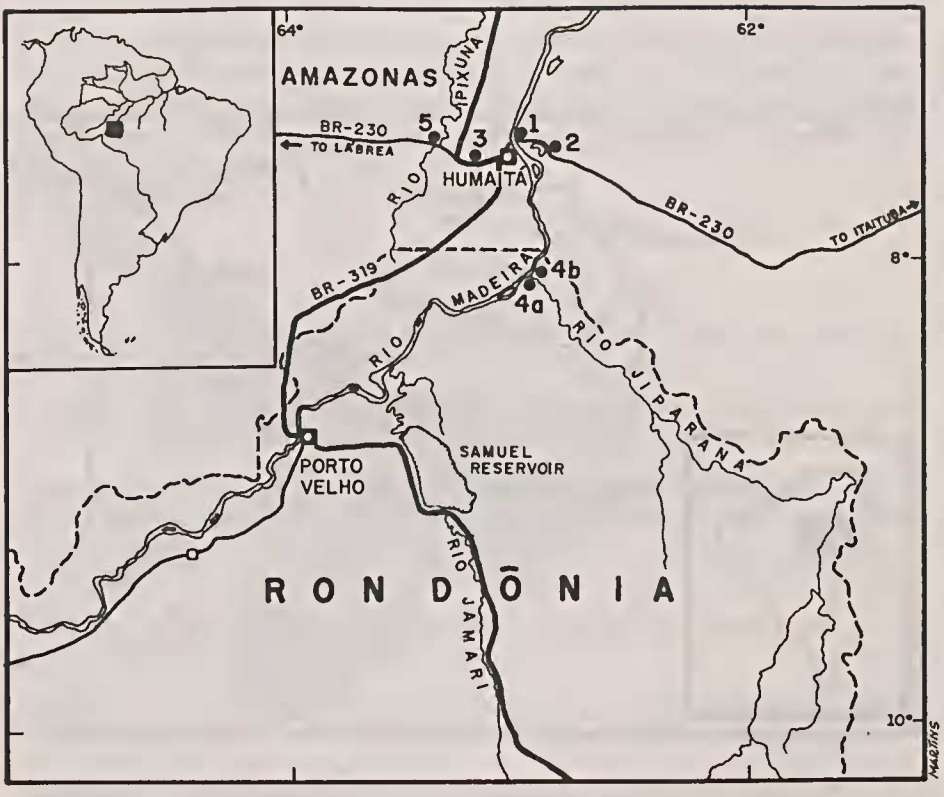


Figure 1. Map of localities mentioned in the text. 1: East bank of Madeira River opposite Humaitá, AM. (7°31'S, 63°02'W); 2: Lago dos Reis, AM, km 17 on BR-230 Humaitá-Itaituba (7°32'S, 62°52'W); Training reserve of the 54th Jungle Infantry Battalion, Humaitá, AM, km 20 on BR-230 Humaitá-Lábrea (7°33'S, 63°12'W); 4a: West bank of the Jiparaná River at Calama, RO (8°05'S, 62°55'W); 4b: East bank of the Jiparaná River at Calama, RO (8°03'S, 62°53'W); 5: Ipixuna River, AM, km 41 on BR-230 Humaitá-Lábrea (7°31'S, 63°22'W).

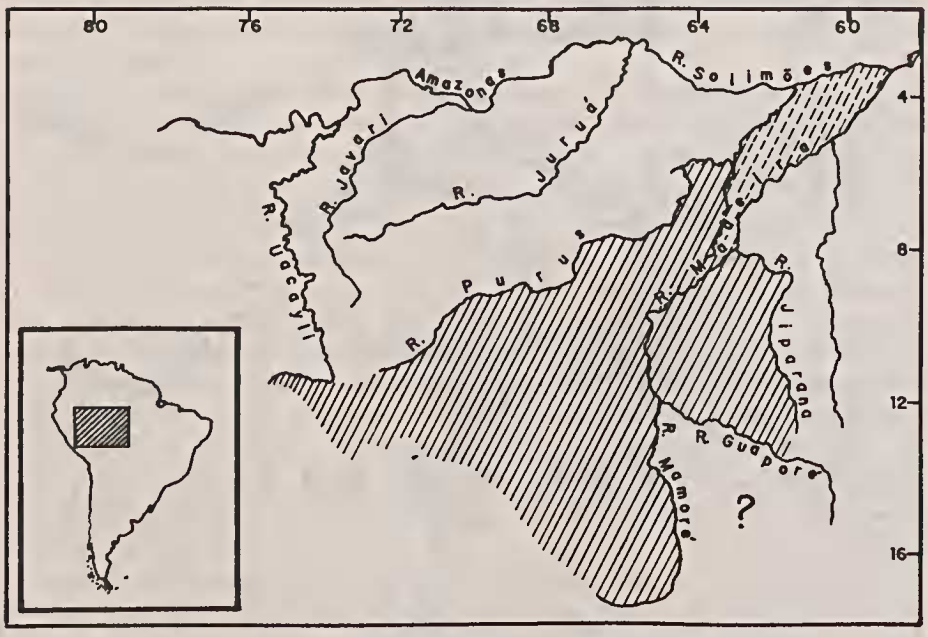


Figure 2. Distribution of *Saguinus fuscicollis weddelli*.

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